REMARKS/ARGUMENTS

The Examiner rejected claims 1-3, 6-9, 14-17, 21 and 38-42 under 35 U.S.C. 103(a) as being unpatentable over Doolittle, U.S. Patent No. 5,237,952 in view of Ness, U.S. Patent No. 6,371,041.

All claims of the pending application have been amended to add the limitations that the submersible has a fixed positive buoyancy and does not include a ballast tank. This fixed positive buoyancy limitation is disclosed throughout the application, for example at Page 6, line 12 – page 7, line 6.

The Examiner states that Doolittle discloses a craft having a positive buoyancy, however the positive buoyancy is obtained through the ballast tank. The applicant submits that the fixed positive buoyancy without a ballast tank is not disclosed or suggested by Doolittle or Ness. Although, Doolittle discloses that ballast tanks are optional, when the ballast tanks are not used, the craft has a natural negative buoyancy which causes the vehicle to sink. With propulsion, the wings are used to support the weight of the craft underwater. "It is to be understood, however, that ballast tanks are not needed with the usual jet aircraft body. These bodies are sealed and <u>will sink</u> due to their own weight." (Doolittle, Col. 2, line 70 – Col. 3, line 5, emphasis added.)

Doolittle discloses a combination submersible and airplane in which the wings are used to lift the body of the vessel through air or water. In the underwater mode, the forward movement causes the wings to generate lift to support the weight of the craft and prevent sinking to the sea floor. The wings allow the craft to fly underwater and surface without the use of ballast tanks.

> When ballast tanks are not used the underwater operation resembles flying as the aerial controls serve to submerge and surface the craft. The only difference between the operation in the air and underwater resides in the greater density of water with respect to the density of the air. (Doolittle, Col. 4, lines 4-9.)

To further support the interpretation that Doolittle does not disclose or suggest a fixed positive buoyancy craft, claim 1 of Doolittle reproduced below:

> A method of normally non-buoyant craft operation in a manner similar in action to continuous flight from one medium to another comprising the maneuvering of a combined air and marine craft capable of submarine activity and continuous development of lifting forces from water to air comprising the steps of traveling underwater in the manner of flight in air ..." (Doolittle Col. 4, line 18, emphasis added.)

Thus, Doolittle only discloses a craft that is non-buoyant (negative buoyancy) without the use of variable buoyancy ballast tanks. Doolittle uses the wings to provide lifting forces against the weight of the craft in the water. Doolittle does not disclose or suggest a craft that has positive buoyancy without a ballast tank system. The craft disclosed by Doolittle is very different than the claimed submersible invention.

In contrast to a negative buoyancy craft that uses wings to lift the weight of the craft within the water or a variable buoyancy craft that uses ballast tanks, the claimed invention is a fixed positive buoyancy submersible that uses wings to submerge the craft.

As discussed, all of the pending claims have been amended to add the limitation "fixed positive buoyancy."

Another significant difference between Doolittle and the claimed invention is that the wings of the Doolittle craft only produce lift to support the weight in air or in water. In contrast, the claimed submersible uses the wings to produce negative lift to overcome the upward buoyant forces so the submersible can dive into the water. All claims have also been amended to add the limitation that the fixed wings provide the submersible with negative lift.

The Examiner also argued that Ness discloses a submersible that has a center of buoyancy that is close to the center of gravity. The submersible described in Ness has a complex system of buoyancy tanks and trim tanks that allow both the center of gravity and the center of buoyancy to be adjusted along the longitudinal axis of the submersible. The system fills and drains the tanks at the ends of the craft with gas or sea water to change the center of buoyancy and the center of gravity.

> Thus, in FIG. 1b, the vehicle is configured for a downward forward dive or descent with the rear planes 22 and the ailerons 26 angled downward, and, the upper air cylinder portion 32 of the buoyancy chambers 28 are flooded to initiate the descent, relocating the center of gravity CG forward and the center of buoyancy CB aft. As seen in FIG. 1b, the aft trim tanks 64 are voided into the forward trim tanks 62 to assist the descent and prevent stalling of the airfoils. The desired rate of gliding or powered descent is controlled by the positioning of the control surfaces, as well as by ballast adjustments.

> Conversely, in FIG. 1c, for a gliding ascent, the relationships are reversed, with the buoyancy air chambers 32 evacuated, the planes and ailerons 22, 26 at an up angle, and the contents of the forward trim tanks 62 pumped aft to tanks 64, thereby relocating the CB forward and the CG aft. The ship would stay at level trim during the ascent/descent cycles and as maneuvered by its planes. Gliding in either direction is independent of positive engine propulsion to the screws. (Ness, Col. 6, lines 36-55, Fig. 2.)

Thus, Ness uses the buoyancy tanks to control the position of the center of buoyancy of the submersible. The applicant submits that Ness does not disclose or suggest a fixed positive buoyancy craft that has a fixed center of buoyancy that is close to the cemter of gravity and does not use buoyancy tanks. For these reasons, the applicant submits that claims 1-3, 6-9, 14-17, 21 and 38-42 are not invalid over Doolittle in view of Ness.

Claims 4, 5, 12, 13, 18-20, 24-32, 36, 37, 43-46, 50, 51, 57-60, 64-72, 76-84, 88 and 89 were rejected under 35 U.S.C. 103(a) as being unpatentable over Doolittle in view of Ness and further in view of Schubert, U.S. Patent No. 3,598,074. Like Doolittle and Ness, Schubert also discloses a submersible that uses ballast tanks that does not have a fixed positive buoyancy. As discussed above with respect to claims 1-3, 6-9, 14-17, 21 and 38-42, all claims have been amended to add the limitations of that the submersible has a fixed positive buoyancy and does not include a ballast tank. For the same reasons discussed above, the applicant submits that claims 4, 5, 12, 13, 18-20, 24-32, 36, 37, 43-46, 50, 51, 57-60, 64-72, 76-84, 88 and 89 are not invalid over Doolittle in view of Ness and Schubert.

Claims 33, 47, 73 and 85 were rejected under 35 U.S.C. 103(a) as being unpatentable over Doolittle in view of Ness, Schubert and further in view of Rowe. The applicant submits that for their intended disclosures, the combination of Rowe and Ness is improper.

In order to combine references there must be a suggestion of combining each of the references. Rowe discloses a craft having positive buoyancy that is operable as a hydrofoil and can be submerged temporarily. "[T]he natural buoyancy of the craft will provide sufficient upward velocity to cause the craft to actually break completely free of the surface, and continue through the air for a short distance in a ballistic arc before striking the water again in the manner of a porpoise." (Roe, Col. 6, lines 42-48.) Thus, the submersible disclosed by Roe does not have any ballast tanks or any other mechanisms which are used to control the buoyancy of the craft.

In contrast, Ness is primarily directed towards a complex buoyancy control system that uses multiple ballast tanks and all claims of Ness include the limitation of variable buoyancy mechanisms. Ness also discloses that buoyancy control is a requirement for all submersibles. "Buoyancy control is essential to safe and facile operation of all undersea craft, as submarines or submersible exploratory vehicles." (Ness, Col. 2, lines 59-61, emphasis added.) Ness does address the similarities between air flight and sea hydrodynamics but discloses that the invention is directed towards ballasting and not underwater flight.

> While, as noted, there are certain similarities and relationships between air flight and sea hydrodynamics, it is evident that resistance to fluid flow about a

> submerged hull is greater than airflow resistance aloft, due to the higher viscosity of water than air. Further, as water is incompressible in sharp contrast to air, a moving undersea body creates more absolute displacement with concomitant greater resistance. As a consequence, the operation of submarines is dependent on ballasting and therefore is more comparable to that of a gas-filled blimp or dirigible, than to heavier-than-air aircraft. (Ness, Col. 1, lines 55-65, emphasis added.)

Thus, Ness uses the air blimp and aircraft analogy to clarify that the operation of the disclosed center of buoyancy control system is used with an air blimp rather than an aircraft. Thus, Ness teaches that the center of buoyancy control system is only intended to be used with submersibles that have a buoyancy control system and not with winged "flying" submersibles. Based upon this text, the applicant submits that Ness expressly distinguishes buoyancy controlled submersibles from winged submersibles. For these reasons, the applicant submits that there is no suggestion of combining the Ness reference with the Roe reference and claims 33, 47, 73 and 85 are not unpatentable over Doolittle in view of Ness, Schubert and Rowe.

Claims 10, 11, 22, 23, 62 and 63 were rejected under 35 U.S.C. 103(a) as being unpatentable over Doolittle in view of Ness, and Kohnen (U.S. Patent No. 5,704,309) and claims 34, 35, 48, 49, 74, 75, 86 and 87 were rejected under 35 U.S.C. 103(a) as being unpatentable over Doolittle in view of Ness, Schubert and Kohnen. Like Doolittle, Ness, and Schubert, the Kohnen reference discloses a submersible that uses ballast tanks and does not have a fixed positive buoyancy. As discussed above with respect to claims 1-3, 6-9, 14-17, 21 and 38-42, all claims have been amended to add the limitations of that the

submersible has a fixed positive buoyancy and does not include a ballast tank. For the same reasons discussed above, the applicant submits that claims 10, 11, 22, 23, 34, 35, 48, 49, 62, 63, 74, 75, 86 and 87 are not invalid over Doolittle in view of Ness and Schubert.

The applicant submits that none of the cited prior art, discloses or suggests a submersible having a fixed positive buoyancy without a ballast tank and a center of buoyancy that is close to the center of gravity. For the reasons discussed above, the applicant respectfully submits that Claims 1-89 are patentable over the cited prior art and request that they be allowed. The Examiner is encouraged to call the undersigned collect at (415) 705-6377 if there are any outstanding issues or questions which can be resolved to allow this application to be passed to issue.

Respectfully submitted,
Dergosits & Noah, LLP

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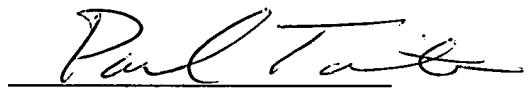
By: 

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